Instruction Manual:
E58 Self-Contained Diffuse Reflective 18mm Tubular Sensors

Models covered in this manual:		AC/DC Models	DC-only Models
Mode	Light Sense (N.O.)	E58CAL18A2D2	E58CAL18T110D2 (NPN)
		--	E58CAL18T111D2 (PNP)
	Dark Sense (N.C.)	E58CBL18A2D2	E58CBL18T110D2 (NPN)
		--	E58CBL18T111D2 (PNP)

⚠ WARNING

THESE PRODUCTS ARE NOT DESIGNED, TESTED, OR RECOMMENDED FOR USE IN HUMAN SAFETY APPLICATIONS.

USE #4 MOUNTING HARDWARE ONLY! LARGER HARDWARE WILL DAMAGE THE SENSOR AND MAY CREATE AN ELECTRIC SHOCK HAZARD. TIGHTEN THE HARDWARE JUST TO THE SENSOR BODY SO NO DEFLECTION OF THE BODY OCCURS.

DURING INSTALLATION, CORRECT POWER CONNECTIONS MUST BE MADE FIRST TO ENSURE FAIL-SAFE SHORT CIRCUIT PROTECTION OF THE OUTPUTS. REFER TO THE WIRING DIAGRAMS IN THIS MANUAL.

DO NOT USE TOOLS TO APPLY TORQUE DIRECTLY TO SENSOR BODY. ALIGN SENSOR BY HAND BEFORE TIGHTENING MOUNTING HARDWARE.

THE GAIN ADJUSTMENT POT IS A 3/4 TURN POT. ANY RESISTANCE ENCOUNTERED WHILE ADJUSTING THIS POT INDICATES YOU HAVE REACHED THE ADJUSTMENT LIMIT STOP. TURNING PAST THIS STOP WILL DAMAGE THE SENSOR.

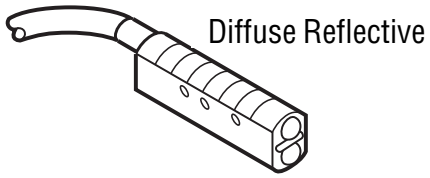
USE ONLY A SUITABLE ADJUSTMENT TOOL OR FLAT BLADE SCREWDRIVER WHEN TURNING THE ADJUSTMENT POT. SHARP OBJECTS CAN DAMAGE THE POT AND RESULT IN ELECTRIC SHOCK.

INTRODUCTION

A diffuse reflective sensor operates by shining a beam of light out through the lens. When an object comes within the sensor's view, it reflects part of this beam of light back to the sensor causing the sensor to detect the object. The maximum range at which a given object can be detected depends on how well its surface reflects light—the less light it reflects back, the shorter the range. The ability of a surface to reflect light depends primarily upon its material of construction, color and texture.

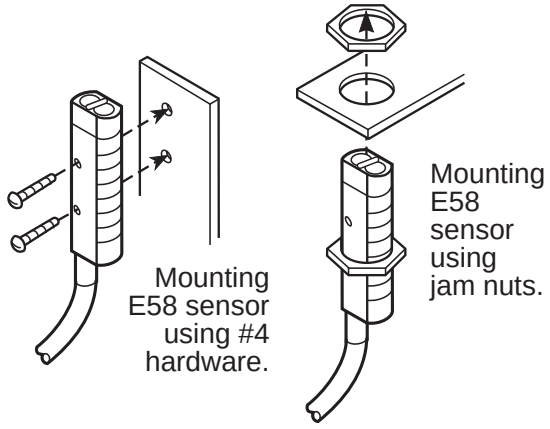
The E58 Diffuse Reflective photoelectric sensors contain both the light source and detector in an 18mm diameter tubular housing. The light source is a light emitting diode (LED) which produces a visible beam of light. The beam is modulated to reduce the susceptibility of the detector to ambient light - the detector responds only to the modulated light source.

All of the electronics necessary to produce and detect the modulated beam are contained in this one housing. An indicating LED is incorporated in the cable end of the sensor to indicate operation. This indicator is useful for set-up and diagnostic purposes.



MOUNTING

The E58 sensor features a threaded housing and includes jam nuts and washers. This allows mounting into any 0.75 inch hole, or any of the mounting brackets shown on page 4 of this manual. Use caution to avoid cross-threading the jam nuts on the sensor body. Tighten jam nuts to less than 4 Nm (36 in.-lbs. or 3 ft.-lbs.) torque to avoid stripping threads.



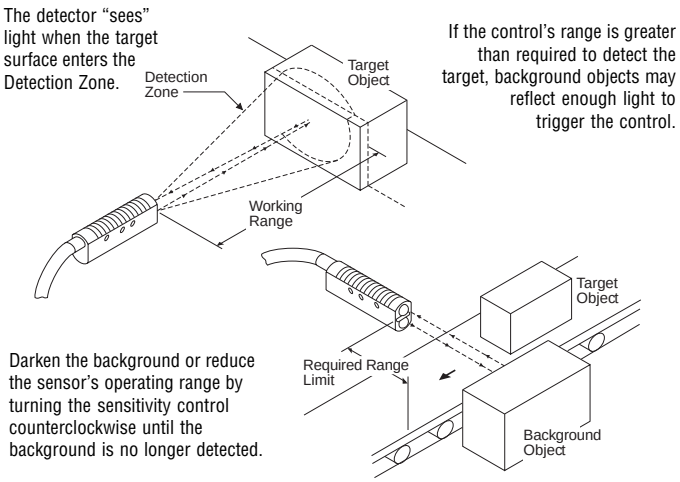
A second mounting method is to use #4 hardware in the 0.125 inch diameter mounting holes in the flat sides of the sensor. This is ideal for mounting the E58 sensor against a wall, piece of equipment, rail, mounting bracket, etc.

MOUNTING LOCATION AND SET-UP

Select a mounting location with a clear view of the object to be detected. Avoid direct reflection from a highly reflective background (or darken the background). Mount the sensor so that it points at the most suitable part of the target object.

Be sure your power supply is OFF, then connect the sensor to the control circuit and power lines. Turn the power supply ON and place a sample object in the beam. Slowly turn the gain adjustment clockwise (see Warning on page 1 concerning pot adjustment) until the LED lights (in light-sense mode). Note the position and remove the sample object. Now continue turning the sensitivity setting clockwise to find the position where the LED lights from the background reflection. Reset the sensitivity midway between the two positions. Tighten all mounting screws.

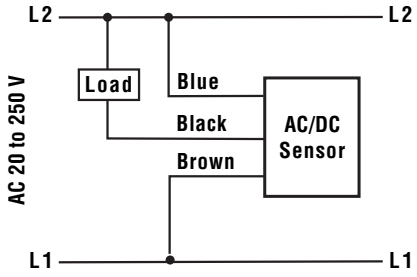
NOTE: If background reflections are low, it will be possible to achieve a maximum gain setting without the LED lighting; in that case, set the gain midway between the first setting and maximum (this will prevent a hysteresis latch-up after sensing an object).


The detector "sees" light when the target surface enters the Detection Zone.
Detection Zone
Target Object
If the control's range is greater than required to detect the target, background objects may reflect enough light to trigger the control.
Working Range
Target Object
Darken the background or reduce the sensor's operating range by turning the sensitivity control counterclockwise until the background is no longer detected.
Required Range Limit
Background Object

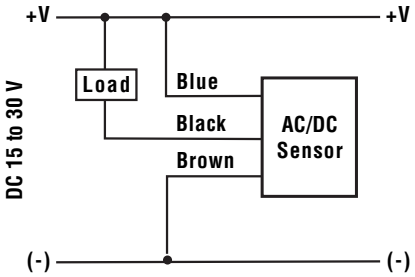
WIRING DIAGRAMS

For wiring cable versions, the color codes shown are the actual wire colors emanating from the sensor.

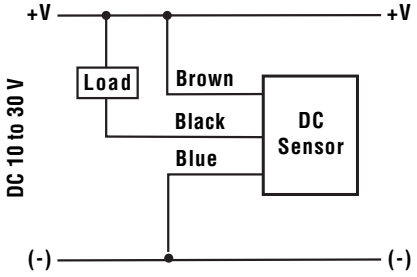
AC/DC Models (AC Connection)



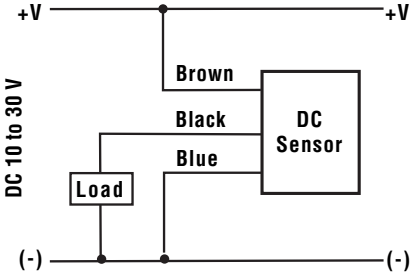
AC/DC Models (DC Connection, see Warning above)



DC Models (NPN Output)



DC Models (PNP Output)

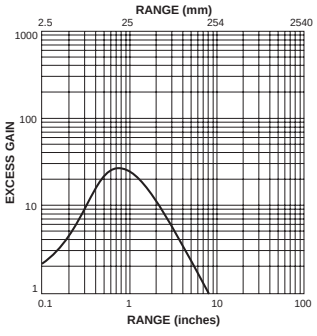


SPECIFICATIONS

	AC/DC MODELS (AC Operation)	AC/DC MODELS (DC Operation)	DC-ONLY MODELS
Input Voltage	20 to 264 V AC, 50/60 Hz	15 to 30 V DC (15 to 24 V DC above 55° C/131° F)	10 to 30 V DC (10 to 24 V DC above 55°C/131° F)
Power Dissipation	1.5 W maximum	1.5 W maximum	1 W maximum
Output Type	VMOS (bi-directional)	NPN (sink)	NPN or PNP
Current Switching Capacity	300 mA maximum	300 mA maximum	PNP (source): 100 mA maximum; NPN (sink): 250 mA max. (120 mA max. above 55° C/131° F)
Voltage Switching Capacity	375 V peak maximum	375 V peak maximum	30 VDC maximum
Off-State Leakage	250 mA typical; 500 mA maximum	250 mA typical; 500 mA maximum	10 mA maximum
Surge Current	2 A maximum	2 A maximum	1 A maximum
On-State Voltage Drop	- - -	1.8 V at 10 mA; 3.5 V at 300 mA	NPN: 400 mV at 10 mA, 1.5 V at 250 mA; PNP: 2.4 V at 100 mA
Response Time	10 mS		1 mS
Short Circuit Protection	Sensor will turn off immediately when a short or overload is detected (Indicator LED will flash). Turn power OFF and back ON to reset. **IMPORTANT**: During installation, correct power connections must be made first to ensure fail-safe short circuit protection of the outputs.		
Light/Dark Operation	By model		
Temperature Range	Operating and Storage: -40° to +70° C (-40° to +158° F)		
Material of Construction	Lens: Polycarbonate; Cable jacket: PVC; Body: Structural polyurethane foam (do not expose to concentrated acids, alcohols, or ketones)		
Cable/Connector	3-meter cable, 3-wire		
Vibration and Shock	Vibration: 30 g over 10 Hz to 2 kHz; Shock: 100 g for 3 mS 1/2 sinewave pulse		
Indicator LED	Lights steady when output is ON; Flashes when short circuit protection is in latch condition		
Sunlight Immunity	10,000 foot-candles		
Enclosure Ratings	NEMA 1, 2, 3, 4, 4X, 6, 12, and 13 Our products conform to NEMA tests as indicated, however, some severe washdown applications can exceed these NEMA test specifications. If you have questions about a specific application, contact our Applications Department.		
Approvals	UL recognized, CSA approved, CE compliant		

OPTICAL PERFORMANCE

All optical specifications are guaranteed to be the minimum performance under clean conditions of any product delivered from stock. Typical performance may be higher.



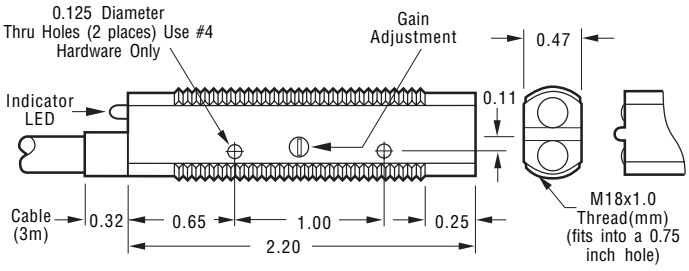
Dirt in the environment will affect optical performance by reducing the amount of light the control receives. For best results, sensors should be used at distances where excess gain is higher than 1.5 (1.5 times the amount of sensing power required to detect an object under ideal conditions). Higher excess gain will allow the sensor to overcome higher levels of contamination on the lens.

All ranges and excess gain graphs are based on a 90% reflectance white card.

Source	Infrared, 880 nm
Maximum Range	8 inches (200 mm)
Optimum Range	0 to 5 inches
Field of View	2 inch diameter at 5 inches

APPROXIMATE DIMENSIONS

(Shown in inches except where noted)



MOUNTING BRACKETS

Mounting Bracket	Allows a minimum adjustment range. Sensor mounts with two jam nuts (included with sensor).	**E57KM18**
L-Shaped Bracket	Two per package. Allows a minimum adjustment range. Sensor mounts with two jam nuts (included with sensor). Chromate finish aluminum	**6161A-6501**
L-Shaped Bracket with Slot Bulk	Two per package (order quantity will be sent bulk packed). Allows installation of sensor with jam nuts in place on sensor body.	**6161AS7050**
Flat Bracket	Allows a minimum adjustment range. Sensor mounts with two jam nuts and washers (included with sensor). Chromate finish aluminum	**6161AS5295**
Flush Mount Bracket	Contoured design with no alignment adjustment. Sensor mounts with #4 studs. 304 stainless steel	**616AS5296**
Flush Mount Bracket	Same as above except with contour. 304 stainless steel	**616AS5297**
Adjustable Bracket	Locking vertical and horizontal adjustments for independent adjustments in each axis. Sensors is electrically insolated from mounting surface. Sensor mounts with two jam nuts and washers (included with sensor). 304 stainless steel	**E58KAM18**
Ball Swivel Bracket	Allows 360 degree rotation and 10 degree vertical tilt. Made from Noryl® .	**6181AS5200**
18mm Ball Swivel Bracket	Allows 360 degree rotation and 10 degree vertical tilt. Suitable for use with any 18mm threaded sensor. Made from 5% glass filled Valox® .	**E58KAM18B**

Still Need Help?

Contact the Cutler-Hammer Sensor Application Engineers

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